

Fast- steering Mirrors

Model – TT25, TT50



TT mirrors come standard with a 25mm or 50mm glass substrate. These closed loop control tip-tilt steering mirrors are electronically commanded and can be used in computer-controlled operations or by remote analog signal. They have become key components in diverse applications such as industrial instrumentation, astronomy, laser communication, imaging systems, experimental optical bench setups as well as many optical research and development projects.

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Features

The TT25 and TT50 mirrors are our most popular fast steering mirror where the substrate optical requirements are less demanding. A closed-loop servo control drives the TT mirror actuators in response to the customer command and position sensor feedback. Control electronics provide the analog command/monitor interface to the customer, the signal conditioning for the sensor readout and the actuator drive currents.

Custom requirements and specifications are welcome and will be quoted on a case-by-case basis.

Features	Values	
	TT-50	TT-25
Mirror Assembly		
Number of Axes	2 (tip - tilt)	2 (tip - tilt)
Aperture	50 mm (2 in)	25 mm (1 in)
Angular Range	± 17.5 mrad (± 1 deg)	± 17.5 mrad (± 1 deg)
Angular Velocity Capability	4.4 rad/sec	5.5 rad/sec
Angular Acceleration Capability	1100 rad/sec ²	1700 rad/sec ²
Mirror Assembly Envelope	127 x 127 x 64 (mm) (5" x 5" x 2.5")	127 x 127 x 64 (mm) (5" x 5" x 2.5")
Mirror Assembly Mass	220 grams (0.49 lb)	200 grams (0.44 lb)
Operating Temperature Range	0° C to 40° C (32° F to 104° F)	0° C to 40° C (32° F to 104° F)
Sensor Warm-up Time for Boresight (Null) Stability	10 minutes	10 minutes
Boresight (Null) Thermal Drift	≤ 9 μ rad/°C	≤ 9 μ rad/°C
Boresight (Null) Stability Over Time, 25° C	≤ 0.5 mrad/month	≤ 0.5 mrad/month
Storage Temperature Range	-20° C to 55° C (-4° F to 131° F)	-20° C to 55° C (-4° F to 131° F)
Optical Characteristics		
Mirror Substrate	Glass protected Aluminum or Gold	Glass protected Aluminum or Gold
Reflectivity	$\geq 90\%$ visible	$\geq 90\%$ visible
Optical Surface	$\lambda/4$ rms	$\lambda/4$ rms
Surface Roughness	≤ 50 Å	≤ 50 Å
Scratch and Dig	60/40	60/40
Electronics Assembly		
Command and Readout Interface	Analog, ± 10 V, (± 17.5 mrad)	Analog, ± 10 V, (± 17.5 mrad)
Resolution, Noise Equivalent Angle	2 μ rad rms	2 μ rad rms
Quiescent Power at FSM Assembly	3.0 W	3.0 W
Peak Operating Power	6.0 W	6.0 W
Recommended Power Supply	± 15 V dc, ± 1.5 A	± 15 V dc, ± 1.5 A
Operating Temperature Range	0° C to 40° C (32° F to 104° F)	0° C to 40° C (32° F to 104° F)
Storage Temperature Range	-20° C to 55° C (-4° F to 131° F)	-20° C to 55° C (-4° F to 131° F)
Electronics Envelope	129 x 127 x 30 mm (5 x 5.06 x 1.19 in)	129 x 127 x 30 mm (5 x 5.06 x 1.19 in)
Control Characteristics		
Small Signal Control Bandwidth (closed loop -3 dB)	≥ 500 Hz	≥ 500 Hz
Response Flatness	Peaking < 6 dB	Peaking < 6 dB
Boresight (Null) Offset, Electronic Adjustment Range	± 1.5 mrad	± 1.5 mrad
Accuracy (Maximum Deviation From Ideal Position), 25° C	2% of full scale (250 μ rad)	2% of full scale (250 μ rad)
Jitter/Wobble	≤ 1.0 μ rad rms	≤ 1.0 μ rad rms
Small Angle Step Response, steps < 250 μ rad:		
rise time to 90%	1 msec	1 msec
settling time within 5%	3.5 msec	3.5 msec
Large Angle Step Response, 10 mrad step:		
rise time to 90%	5 msec	5 msec
settling time within 5%	11 msec	11 msec
Disturbance Rejection Bandwidth	70 dB @ 1Hz	70 dB @ 1Hz
Cross-axis Coupling	$\leq 0.1\%$	$\leq 0.1\%$